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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,652	05/20/2004	Michael P. Belyansky	FIS920040047US1	3651

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INTERNATIONAL BUSINESS MACHINES CORPORATION  
DEPT. 18G  
BLDG. 300-482  
2070 ROUTE 52  
HOPEWELL JUNCTION, NY 12533

EXAMINER

LINDSAY JR, WALTER LEE

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 06/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/709,652	<b>Applicant(s)</b> BELYANSKY ET AL.	
	<b>Examiner</b> Walter L. Lindsay, Jr.	<b>Art Unit</b> 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10, 13, 15, 16 and 18-20 is/are rejected.
- 7) ☒ Claim(s) 11, 12, 14 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>5/20/2004</u> . | 6) <input type="checkbox"/> Other: ____  |

### **DETAILED ACTION**

This Office Action is in response to an Election filed 5/12/2005.

Currently, claims 1-20 are pending. Claims 1-9 are withdrawn from consideration.

#### ***Election/Restrictions***

1. Applicant's election without traverse of claims 10-20 in the reply filed on 5/12/2005 is acknowledged.
2. Claims 1-9 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected device, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 5/12/2005.

#### ***Specification***

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 10, 15-16 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu (U.S. Patent No. 6,297,115, dated 10/2/2001) in view of Yu (U.S. Patent No. 6,194,748, dated 2/27/2001).

Yu (115) shows the method substantially as claimed in Figs. 5-7 and corresponding text as: depositing a dielectric material (32) (col. 4, lines 20-29); etching the dielectric material to form a spacer (32)(col. 4, lines 20-29); and depositing a thin layer (52) over the dielectric material (col. 5, line 62-col. 6, line 13) (claim 10). Yu (115) teaches that the thin layer comprises oxide (col. 5, line 62-col. 6, line 13) (claim 19).

Yu (115) shows the method substantially as claimed and as described in the preceding paragraph.

Additionally, Yu teaches: the spacer, further comprising depositing a thin layer on the spacer to prevent moisture absorption (oxide layers formed over structures are use to prevent moisture absorption)(col. 5, line 62-col. 6, line 13) (claim 18).

Yu (115) lacks anticipation only in not explicitly teaching that: 1) forming pores in the dielectric material; and depositing a thin layer over the porous dielectric material (claim 10); 2) the spacer comprise a Si-O-C-N type of low-k material (claim 13); 3) the

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spacer has a reduced dielectric constant (k) (claim 15); 4) the reduced dielectric constant (k) is less than 3.85 (claim 16); and 5) the spacer is porous, and further comprising depositing a thin layer on the spacer to prevent moisture absorption (claim 18).

Yu (748) shows a MOSFET with porous sidewall spacers. Yu shows a spacer (38) that is formed of a porous material with a dielectric constant less than 3.0 but greater than 2.0 (xerogels or aerogels) (col. 4, lines 44-62). This structure aids in eliminating gate-edge fringing field effect, which can adversely affect the ability of the gate conductor to couple to the channel and to the source/drain extensions and also degrade the control of charges in the channel by the gate stack, thereby degrading sub-threshold characteristics of the transistor (col. 2, lines 15-32).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the method shown in Yu (115), forming the spacers of a porous dielectric material, with a dielectric constant (k) is less than 3.85, as taught by Yu (748), with the motivation that Yu teaches the elimination gate-edge fringing field effect, which can adversely affect the ability of the gate conductor to couple to the channel and to the source/drain extensions and also degrade the control of charges in the channel by the gate stack, thereby degrading sub-threshold characteristics of the transistor.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu (U.S. Patent No. 6,297,115, dated 10/2/2001) in view of Yu (U.S. Patent No. 6,194,748, dated

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2/27/2001) as applied to claim 10 above, and further in view of Mandelman et al. (U.S. Patent No. 6,429,477 dated 8/6/2002).

Yu (115) as modified by Yu (748) shows the method substantially as claimed and as described in the preceding paragraph.

Yu (115) as modified by Yu (748) lacks anticipation only in not explicitly teaching that: 1) the thin layer has a thickness of less than 5 nm (claim 20).

Mandelman shows a transistor device that incorporates thin layers. Thin layer (230) is formed over sidewall spacer (228) (col. 5, lines 24-32); the thin silicon oxide layer is formed between the thicknesses of 2nm-5nm (col. 5, lines 42-54). This allows the transistor to be formed with self-aligned body contact this minimizes tolerances need while minimizing process complexity.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the method shown in Yu (115) as modified by Yu (748), by forming the thin layer with a thickness of less than 5 nm, as taught by Mandelman, with the motivation that Mandelman teaches that the thin layer allows the transistor to be formed with self-aligned body contact this minimizes tolerances need while minimizing process complexity.

***Allowable Subject Matter***

8. Claims 11, 12, 14 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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9. The following is a statement of reasons for the indication of allowable subject matter: the prior art, either singly or in combination fails to anticipate or render obvious, the limitations of:

...wherein the spacer is made porous by exposing the spacers to an oxygen plasma, as required by claim 11, as it depends from claim 10;

...wherein the spacer comprises organic material; and

the spacer is made porous by removing the organic material, as required by claim 12, as it depends from claim 10;

...wherein the pores are formed during the spacer etch, rather than during deposition of the dielectric material, as required by claim 14, as it depends from claim 10; and

...wherein the reduced dielectric constant (k) is less than 7.0, but greater than 3.85, as required by claim 17, as it depends from claim 10.

### ***Conclusion***

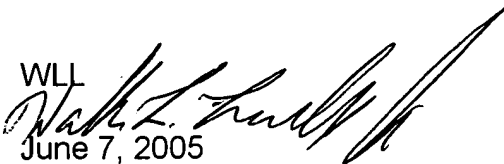
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter L. Lindsay, Jr.  
Examiner  
Art Unit 2812

WLL  
  
June 7, 2005